solve $x^2 - 5x - 6 = 0$

$$(x-6)(x+1) = 0$$
$$x = 6, -1 \quad \text{zeros}$$

Theorem If $r_1, r_2, \ldots$ are zeros of $f(x)$, then
$f(x) = (x - r_1)(x - r_2) \ldots$

Examples: Write a polynomial function of least degree with the given zeros.

ex. 1
$$\overset{r_1 \ r_2 \ r_3}{0, -1, \frac{2}{3}}$$

$$x = \frac{2}{3}$$
$$3x = 2$$
$$3x - 2 = 0$$

$$f(x) = (x-0)\left(x-(-1)\right)\left(x - \frac{2}{3}\right)$$
$$= x(x+1)(3x-2)$$
$$= (x^2 + x)(3x-2)$$
$$f(x) = 3x^3 + x^2 - 2x$$

ex. 2
$$-\sqrt{2}, 3i$$
$$☆ \quad \sqrt{2}, -3i$$

$$f(x) = x^4 + 7x^2 - 18$$

$$f(x) = (x+\sqrt{2})(x-\sqrt{2})(x-3i)(x+3i)$$
$$\underline{(x^2-2)(x^2-9i^2)}$$
$$\overset{(-1)}{}$$
$$f(x) = (x^2-2)(x^2+9)$$

ex. 3 $\underline{1}, -2, 3 - \sqrt{2}$

$3 + \sqrt{2}$

$f(x) = (x-1)(x+2)(x-(3-\sqrt{2}))(x-(3+\sqrt{2}))$

$(x^2 + x - 2)(x^2 - (3+\sqrt{2})x - (3-\sqrt{2})x + (9-2))$

F   O   I   L

$(x^2 + x - 2)(x^2 - 3x - \sqrt{2}x - 3x + \sqrt{2}x + 7)$

$f(x) = (x^2 + x - 2)(x^2 - 6x + 7)$

$f(x) = x^4 - 5x^3 - x^2 + 19x - 14$